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DISEASE SUSCEPTIBILITY OF APPLE VARIETIES IN OHIO

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That there are great differences among the varieties of apples grown in the State, with respect to the diseases from which they suffer, is well known to both nurserymen and orchardists. The endeavor in this paper has been to present these differences as accurately as known, in tabular form, hence a comparative summary is given for the varieties included.

In form of statement, the relative susceptibility of each variety to the diseases Crown Gall, Collar-Rot, Blister Canker, Scab, Bitter-Rot, Blotch, Black-Rot of Fruit and Canker of branch, Physiological Fruit Spot and Fungus Fruit Spot are given, together with a column upon special weaknesses when such are known. By susceptibility is meant the tendency to be attacked by the disease and to suffer from it; susceptibility is used as the opposite of resistance. When a variety is susceptible to a given disease it is non-resistant; when not susceptible the variety is properly said to be resistant to the trouble and if not known to be attacked by the disease which is present on other sorts in question it may properly be recorded as "immune".

Under the columns devoted to certain diseases it will be seen that the record is very incomplete; under the more serious diseases mentioned upon which our information is limited, question marks have been freely used. This is especially the case in the columns devoted to records upon Collar-Rot and Blister Canker. These marks are used to indicate both the absence of information and the urgent need of it before we can know the probabilities of these varieties in the southern districts where Collar-Rot and Blister Canker have heretofore caused the most injury.

UTILITY OF A TABLE OF DISEASE SUSCEPTIBILITY

The commercial importance of accurate information as to disease susceptibility is very great; the ultimate aim of this circular is to collect such complete and accurate data with regard to Ohio apple varieties. Apple orchards normally live for many years so that the investment in an orchard is semi-permanent and the premature loss of a part of it operates as a loss of capital to the owner. Thus premature loss or dying of portions of bearing orchards operates to diminish both the profits of the individual owner and the commercial possibilities of the community. The dying of Grimes trees in southern Ohio from Collar-Rot and of Ben Davis from Blister Canker may be cited to illustrate the action of these two diseases. Similarly

	Variety	Diseases							
		Crown Gall	Collar Rot	Blister Canker	Twig Blight	Scab	Bitter Rot	Blotch	
1	Arkansas (Mam. Blk. Twig)	Moderately	?	?	Slightly	Rather seriously	Moderately suscep.	.....	1
2	Arkansas Black	Slightly	.....	?	Slightly	Seriously	?	.....	2
3	Babbitt	.....	.....	?	Almost immune	Somewhat suscep.	?	.....	3
4	Baldwin	.....	Moderately—South	.....	Slightly	Very slightly	Very slightly	Very slightly	4
5	Baltimore	.....	.....	.....	Very suscep.	Very slightly	Very slightly	.....	5
6	Bellflower	.....	.....	?	Rather suscep.	Somewhat suscep.	?	.....	6
7	Bentley-Sweet	.....	Moderately	Probably suscep.	Moderately	?	Very suscep.	?	7
8	Ben Davis	Occasionally	Moderately	Very suscep.	Moderately	Very slightly	Quite suscep.	Rather suscep.	8
9	Canada Red	Quite suscep.	.....	.....	Very slightly	Quite suscep.	Quite suscep.	.....	9
10	Delicious	.....	.....	.....	Nearly immune	Very suscep.	.....	.....	10
11	Early Harvest	Seriously	.....	?	Very suscep.	Very suscep.	Somewhat	.....	11
12	Esopus Spitzenburg	.....	.....	?	Rather suscep.	.....	.....	.....	12
13	Gano	.....	.....	Probably suscep.	Moderately	Very slightly	Quite suscep.	Rather suscep.	13
14	Grimes Golden	.....	Very suscep.—South	Quite suscep.	Not seriously	Not seriously	Quite suscep.	Rather suscep.	14
15	Greenville	.....	?	?	?	.....	.....	?	15
16	Hubbardston	.....	.....	.....	.....	Somewhat	.....	.....	16
17	Jonathan	Very suscep.	Moderately	?	Rather suscep.	Slightly	Moderately suscep.	.....	17
18	King David	?	?	?	Very slightly	.....	.....	.....	18
19	Maiden's Blush	.....	Very suscep.	?	Quite suscep.	Very suscep.	Quite suscep.	Frequently	19
20	Mann	Moderately	.....	?	Moderately	Slightly	?	Very suscep.	20
21	McIntosh	Seldom	.....	.....	Sometimes suscep.	Very suscep.	.....	.....	21
22	Newtown Pippin	.....	Very slightly	.....	Quite suscep.	Very suscep.	Moderately	?	22
23	Northern Spy	Very suscep.	Rather suscep.—South	Somewhat	Quite severely	Very suscep.	Very suscep.	.....	23
24	Oldenburg	.....	?	?	Sometimes	Somewhat suscep.	.....	.....	24
25	Rambo	Moderately	Very slightly	Rather suscep.	Slightly	Very suscep.	Very suscep.	Occasionally	25
26	Rome Beauty	Occasionally	Slightly suscep.	Quite suscep.	Slightly	Very suscep.	Slightly suscep.	Slightly	26
27	Rhode Island Greening	Moderately	?	?	Very suscep.	Slightly	Moderately	Slightly	27
28	Salome	Moderately	?	?	Moderately	.....	Very suscep.	.....	28
29	Sutton Beauty	.....	Very suscep.	?	Very suscep.	.....	?	.....	29
30	Stayman's Winesap	Moderately	?	?	Moderately	Quite suscep.	?	?	30
31	Stark	?	?	?	Very suscep.	Slightly	?	Very suscep.	31
32	Smith's Cider	Very suscep.	Very slightly	Not seriously	Very suscep.	Very suscep.	Moderately	Very suscep.	32
33	Tompkins King	Moderately	Very suscep.	.....	Very suscep.	Somewhat	Moderately	.....	33
34	Wealthy	.....	Very slightly	?	Slightly	Very slightly	Slightly (?)	?	34
35	White Pippin	.....	Very slightly	?	Not suscep.	Moderately	Slightly	.....	35
36	Winesap	Moderately	.....	.....	Slightly	Seriously	.....	.....	36
37	Yellow Transparent	Occasionally	Quite suscep.	.....	Rather suscep.	Quite suscep.	Occasionally	.....	37
38	York Imperial	Moderately	?	?	Slightly	Moderately	.....	.....	38

DISEASE SUSCEPTIBILITY OF APPLE VARIETIES IN OHIO—Concluded.

	Variety	Diseases				
		Black Rot of Fruit and Canker	Physiological Fruit Spot or Baldwin Spot	Fungus Fruit Spot *Phoma* (*Cylindrosporium*) *pomi*	Special Weaknesses	
1	Arkansas (Mam. Blk. Twig)	?	Occasionally	Slightly	Good tree	1
2	Arkansas Black	Slightly suscep.	Seldom	After maturity	.....	2
3	Babbitt	Slightly	Seldom	Moderately	Scab susceptibility	3
4	Baldwin	Moderately	Very suscep.	Occasionally	Late, biennial bearing; winter injury	4
5	Baltimore	.....	.....	Occasionally	.....	5
6	Bellflower	Moderately suscep.	Sometimes seriously	Moderately	Lack of fruitfulness	6
7	Bentley-Sweet	?	Not suscep.	After maturity	Susceptible to bitter rot	7
8	Ben Davis	Rather suscep.	Not suscep.	Very slightly	Susceptible to blister canker	8
9	Canada Red	Very suscep.	None	Moderately	Susceptible to black rot	9
10	Delicious	?	Not suscep.	Slightly suscep.	Good tree	10
11	Early Harvest	Slightly suscep.	Sometimes	Moderately	Crown gall and scab	11
12	Esopus Spitzenburg	Very suscep.	.....	.....	Splitting of crotches and sun scald	12
13	Gano	?	Not suscep.	.....	.....	13
14	Grimes Golden	Quite suscep.	Frequently	Seriously	Suscep. to collar rot	14
15	Greenville	Quite suscep.	.....	Very seriously	Storage scald and fruit spot	15
16	Hubbardston	Serious on mature fruit	Seldom	?	..... [when old	16
17	Jonathan	Slightly suscep.	Very seriously *	? *	Poor growth when young; weak limbs	17
18	King David	.....	Very suscep, 1912	Moderately	Water core and physiological spot	18
19	Maiden's Blush	Very slightly	Not suscep.	.....	.....	19
02	Mann	Quite suscep.	?	Very suscep.	Weak root system	20
12	McIntosh	Sometimes suscep.	Seldom	Occasionally	Incline to drop before mature	21
22	Newtown Pippin	Quite suscep.	Not suscep.	Probably suscep.	Scabs badly	22
23	Northern Spy	Very suscep.	Very suscep.	Moderately	Late bearing	23
24	Oldenburg	Cankers frequent	.....	.....	Good tree	24
25	Rambo	Quite suscep.	Slightly suscep.	?	Scab and bitter rot	25
26	Rome Beauty	Moderately	Not suscep.	Very slightly		26
27	Rhode Island Greening	Moderately suscep.	Occasionally	Very seriously	Twig blight	27
28	Salome	Very suscep.	.....	Very suscep.	Shrivel in storage	28
29	Sutton Beauty	Quite suscep.	.....	Slightly	Twig blight	29
30	Stayman's Winesap	Slightly suscep.	Not suscep.	Slightly	Good tree	30
31	Stark	Quite suscep.	Frequently	Quite suscep.	.....	31
32	Smith's cider	Very suscep.	Not suscep.	.....	Black rot and blotch	32
33	Tompkins King	Moderately	Rather seriously	Aftermaturity, very suscep.	Collar rot	33
34	Wealthy	Very slightly	Not suscep.	.....	Good grower; easily injured in winter	34
35	White Pippin	Quite suscep.	Occasionally	Susceptible	Good tree	35
36	Winesap	Slightly	Seldom	Very suscep. after maturity	Suscep. to scab	36
37	Yellow Transparent	Very slightly	.....	.....	Fair tree, too upright	37
38	York Imperial	Very suscep.	Very suscep. 1912	Slightly	Scalding in storage	38

* Spots on fruit of Jonathan adjudged as physiological, not parasitic.

in northern Ohio the recent losses of Baldwin trees from winter injury have been closely parallel in results to the disease attacks of the southern districts. The differences in final results will largely depend upon the cumulative or continuous effects of unchecked disease attack as compared with the occasional recurrence of winter injury. If both classes of risks of capital impairment in the orchard are avoidable under otherwise equally favorable outlook for profit, then foresight demands such action.

It is a fatal weakness in such an investment as is represented by an apple orchard to be burdened with varieties possessing such marked disease susceptibility as is shown by Grimes and Ben Davis with respect to Collar-Rot and Blister Canker; an equal drawback is shown by Bently Sweet in its susceptibility to Bitter-Rot. In the case of Grimes we may overcome the Collar-Rot very largely by top-grafting the trees, but no such means of avoiding the varietal weaknesses or special susceptibilities are known in the great mass of parasitic diseases covered by the table. Commercial apple growing demands efficient performance by each orchard unit such as the apple tree. Any continued failure in performance which may also become a source of outlay, as in disease control, involves risks that the orchardist should seek to avoid in his selection of varieties to plant. The table here offered supplies the approximate basis upon which varietal selections may be founded, though at the same time warnings against other weaknesses are included.

DISEASE DESCRIPTION ELSEWHERE

The diseases to which references are made can not be described within the limits of a brief paper. These descriptions are published in Bulletin 214, "A Brief Handbook of the Diseases of Cultivated Plants in Ohio," March, 1910, which may be obtained upon application. The Blister Canker is discussed in a separate paper, Circular No. 125, while the directions for spray treatment to control diseases of the apple are found iu the Spray Calender, Bulletin 232.

ACKNOWLEDGEMENTS.

While the differences in the susceptibility to disease, shown by the varieties of apples commonly grown, have been stated in Station Bulletins and in plant disease reports to the State Horticultural Society, the tabulations of these difference had not been indicated.

Prof. W. J. Green, Station Horticulturist, suggested late in 1912 that such a table would be very useful if it could be prepared. Accordingly the writer began the preparation of the table and wishes to express his obligations to Professor Green for much data included. Messrs. J. B. Keil and Paul Thayer, of the Department of Horticulture, have contributed very largely to the matter included. Professors W. Paddock and V. H. Davis, of the Ohio State University, have assisted in a similar manner and verbal notes have been contributed by a number of apple growers.

It is by the free offering of additional notes and corrections to the matter as herein published that we shall be able more nearly to complete such a table of Apple Disease Susceptibility and make it of greater service.